

preserving, as I do not know we have any account of such another, unless what Dr. Halley, in Philosophical Transactions, N^o 278. calls two arches of circles touching the halo at top and bottom, can be supposed to be imperfect parts of an elliptic halo not wholly seen.

With all due respect, I remain,

S I R,

Your humble servant,

Lyndon, March 3, 1760.

T. Barker.

III. *An Account of a Meteor seen in New England, and of a Whirlwind felt in that Country: In a Letter to the Rev. Tho. Birch, D. D. Secretary to the Royal Society, from Mr. John Winthrop, Professor of Philosophy at Cambridge in New England.*

Reverend Sir,

Read Jan. 15, 1761. **I** Am extremely obliged to the Royal Society, for their favourable acceptance of my paper on our late great earthquake; and to you, Sir, for the very polite manner, in which you were pleased to inform me thereof. I wish I were able to communicate any thing worthy the attention of so illustrious a body. But no such thing occurs at present; unless you should be of opinion, that the

5

two

two following accounts, in the meteorologic way, are so in some degree.

The first is of a meteor, by which the southern parts of this province were greatly alarmed, on Thursday, the 10th of May last, about 35' after Nine in the morning. The weather being then fair and calm, the people at Bridgewater, and the towns near it, about 25 miles south from hence, were surprized with a noise, like the report of a cannon, or volley of small arms, which seemed to come from the west. This report was followed by a rumbling noise, which most took for the roar of an earthquake; and, when it had lasted about a minute, there was another explosion, like that of a cannon; and about as long after, a third; the roaring noise, in the mean time, increasing, so as to fill the air all around, to the great terror and amazement of those who had heard it, as some of them have informed me. After this third explosion, the noise gradually abated, seeming to go off toward the south-east; having lasted, in the whole, as was judged, about 5'. This is all I can collect of the real fact, from the several accounts given in those places, where the noise was loudest. That sound, which most took for the roar of an earthquake, some compared to the beating of drums; and added some circumstances, with relation to it, too whimsical to be here repeated. It is sufficient to observe, in general, that they were such as were probably suggested by an imagination prepossessed with ideas of war, and, at that time, terrified to a great degree.

As to the extent of these noises, they were heard as far north as Roxbury and Boston; east, a league beyond

beyond Cape Cod; south, at Martha's Vineyard and Rhode Island; and west, at Providence and Mendon; filling a circle of about 80 miles in diameter, the center of which was at Bridgewater, or near it.

The meteor, which produced these noises, was not seen near the center of this circle, but only near the circumference. The most distinct account I have had of it, was from a creditable person at Roxbury, a town adjoining on Boston, who informed me, that, about ten o'clock that morning, he saw in the air a ball of fire, about 4 or 5 inches in diameter, drawing a train of light after it. The ball was of a white brightness, exceeding, in his opinion, that of the sun. Though the sun then shone out clear, this fire-ball was bright enough to cast a shade, by which he first perceived it in the south-east, passing below the sun. For he was standing with his back toward that and the sun; but this shade put him upon turning round, to discover what might be the cause of it. He says, the ball moved parallel to the horizon from the north-east toward the south-west, not above half so fast as shooting stars generally do, and disappeared while he was looking on it; and that about 4 or 5' after, he heard a kind of rumbling noise, somewhat like that of an earthquake; which was also heard by many others in Roxbury.

From a vessel about a league south-west from Cape Cod, and from Martha's Vineyard, we have received like accounts of a bright ball in the heavens, sufficient to ascertain the reality of the meteor, but not to determine its height and course. Near the center of the fore-mentioned circle, the meteor must have passed too near the sun to be visible.

The

The other account I had in view, is of a whirlwind, which happened on Tuesday, the 10th of this instant July, at Leicester, a town in this province, situated about 40 miles west from hence. In point of violence, it seems to have equalled any, and exceeded most, that have happened in this country, so far as I can judge by the accounts I have seen, and, indeed, most, that are recorded in the Philosophical Transactions. I was very desirous to have gone myself, to take a view of its destructive effects, but an infirm state of health has prevented me. However, I have received such informations from several gentlemen, who have been on the spot, as enable me to give a particular account of it; in which I shall relate nothing but what, I am well assured, may be relied on as fact.

The morning of the 10th July with us, at Cambridge, was fair and hot, with a brisk gale at south-west. The afternoon was cloudy. About five, it began to rain, and thundered once. At Leicester, several people of credit say, that about five o'clock the sky looked strangely; that clouds from the south-west and north-west seemed to rush together very swiftly, and, immediately upon their meeting, commenced a circular motion; presently after which, a terrible noise was heard. The whirlwind marched along from south-west to north-west. Its first effects were discernible on a hill, where several trees were thrown down, at considerable distances from each other. On the north-east side of this hill, was a tree, which seemed to have been stript of its limbs on the south side, nearly from the top to the bottom. At the foot of the hill was a swamp, through which

the progress of the wind could not be followed, without great difficulty; though, by the appearance of the swamp from the hill, the violence seems to have been increased. After passing the swamp, it struck the open side of a hill with prodigious force. Here lay a great number of large stones, many of which were thrown out of the beds they had made; particularly one, judged to be near 150 lb, was moved from its place 3 or 4 feet; and others, which were smaller, to greater distances. Here also lay the trunk of a great tree, $2\frac{1}{2}$ feet in diameter at the butt-end, and about 40 feet long, which was rolled over, one turn, out of its bed, toward the upper part of the hill. The trees on the side of this hill, and in a valley to the south of it, did not stand thick, but were, in general, large: most of these were torn up by the roots, and thrown down in almost all directions; many at right angles to the course of the wind, some with their tops south-east, others north-east; one, which had been broken off about 10 feet from the ground, lay with its top about south-west, that is, contrary to the course of the wind. The current of air at that place was judged to have been about 40 rods wide, from the side of the hill across the valley before-mentioned; its greatest violence being, by its effects, discernible along the side of the hill. Having then passed over some clear land, for about half a mile, on which it left no other marks than part of a corn-field levelled, and the stone-walls and fences thrown down, it came to the dwelling-house of one David Lynde, the only one, which stood in its way: upon this it fell with the utmost fury, and, in a moment, effected its complete destruction,

struction, as I shall presently relate. About 3 or 4 rods before it came to the house, it took up an apple-tree by the roots, and carried it into the yard before the house. After passing the house, and throwing down the fences, and several trees, which stood in its course, it seemed, by the effects, to have altered its direction a little more to the eastward. In this direction, it passed through a field of grain, in which it made a lane of 8 or 10 rods wide; from whence it proceeded through a swamp, where, by a view from the side of it, it appeared to have made great havock; and after this, it passed over a pond about half a mile distant from the house. No effects of it were visible upon the ground to a greater distance than 4 miles from the house, north-eastward, or about 6 miles from the place where it began.

To come now to the destruction of the house. This was in the form of an \perp ; one part fronting the south, on the country road, from which it stood back about 2 rods; the other part fronting the east. In the middle of the south front was a door, distant from the chimney about 4 feet. Behind the eastern room was the kitchen, the chimney of which stood at the north end; and the door of it was in the eastern front. The house was of wood, two stories high; and both the chimneys of stone. Near the house were a shop and small shed; and the barn stood on the opposite side of the road, south, about 10 rods distant. As soon as they perceived the storm coming near the house, some men within endeavoured to shut the south door; but before they could effect it, they were surprized by the falling of stones around them, from the top of that chimney, which was in the

middle of the house. All the people in the house were, in that instant, thrown into such a consternation, that they can give no account of what passed during this scene of confusion, which was, indeed, very short. It may be judged of by the effects, and by the testimony of credible men, who lived near, and, in a few minutes after the wind, viewed the desolation made by it. Where the house stood, nothing remained but the fills, and the greater part of the lower floor, with part of the two stacks of chimneys, one about 10 feet, and the other not quite so high; the stones, which had composed the upper part, lying all around them; and the fills, at the south-west corner, were started out of their places round to the northward. Except these fills, there were only three pieces of timber, and those very large, left intire; one of which, about 16 feet long, and 10 inches by 8, was found on the opposite side of the road, nearly south, about 20 rods distant from the house. The rest of the timbers, from the greatest to the least, lay broken and twisted to pieces between N. N. E. and E. for 70 or 80 rods from the house; some upon the ground, others sticking into it a foot and two feet deep, in all directions. Part of one of the main posts, about 10 feet long, supposed to be the N. W. corner post, with part of one of the plats of nearly the same length, and a brace which holds them together, were left sticking in the ground, nearly perpendicular, to a great depth, in a field southerly from the house about 8 rods distant. The boards and shingles of the house, with 3 or 4000 new boards, which lay by it, were so intirely shattered, that scarce a piece could be found above 4 or 5 inches

5 inches wide, and vast numbers were not more than two fingers wide; some within the course of the wind, and some without, at great distances on both sides of it (as were the timbers), sticking in the ground, some nearly perpendicular, others inclining severally towards almost all points of the compass.

What has been said of the boards and shingles, is likewise true of the wooden furniture of the house: the tables, chairs, desks, &c. shared the same fate; not a whole stick was to be found of any of them. Some of the beds, that were found, were hanging on high trees at a distance. Of the heavy utensils, pewter, kettles, and iron pots, scarce any have been found. Some nails, that were in a cask in the east chamber, were driven, in great numbers, into the trees on the eastern side of the house. The shop and shed, before-mentioned, were torn in pieces, nothing of the shop remaining, but the fills and floor; and a horse standing under the shed was killed. Another horse, in a pasture at some distance from the house, on the eastern side, ran toward the house, as soon as the storm was passed, trembling in an extraordinary manner, and presently lay down and died. 'Tis supposed, he received some violent blow from some pieces of the house. The barn was thrown down, but its parts remained in a heap, without being dispersed.

Such was the catastrophe of this house, which was effected in a very short space of time, as we learn from the testimony of one Warren, whose house stood about 50 rods easterly on the road. He says, that, upon hearing the wind, and seeing the rain beat into one of his doors, which looked toward

Lynde's

Lynde's house, he went and shut it; at which time, he saw the house and barn standing; but going from it a little way, without bolting it, and reflecting, that it might blow open, he returned to bolt it; from whence, before he had proceeded cross the room to bolt another door, that fronted the road, a large piece of timber from Lynde's house struck the cap of the door last-mentioned, and burst it open; so that from the time he saw the house standing, to the time of his door's being burst open, could hardly be more than a minute.

It is really extraordinary, that, in so sudden and general a devastation, any persons could escape with their lives. And yet the providence of GOD so ordered it, that but one life was lost. There were, at that time, in the house fourteen persons; Mr. Lynde, his negro man, nine women and children, and three travellers, it being a public-house; of all which, the negro only lost his life. It is supposed, he was in the west chamber. He was found south, a little easterly from the house, about 8 rods, lying across a low wall, and a bed near him, which had been in the west chamber: his back, thighs, and arms, were broken, and he soon expired, in extreme misery. His master, supposed to have been in the west lower room, was found nearly in the same direction, about 2 rods distant. He was winding his watch at that time; and the watch was found at one distance, and the case at another. The three travellers were found on the floor, near the south door, which they had endeavoured to shut, much cut and bruised by the stones falling from the chimney, which lay round them. Three young women and a child were found unhurt

on the kitchen floor, near to, and partly under, the east door, which was blown down upon them, as they were endeavouring to shut it. The mistress of the house, with a child in her arms, and two others, being in the kitchen, near a passage into the cellar, were forced down several stairs, where they were found; the woman being slightly hurt by some pieces of boards, which fell upon her. A child, standing near the chimney, was buried in its ruins; but happily preserved by a piece of board, which, falling obliquely against the jamb, secured it from the falling stones. Besides the persons in the house, there was a girl, about seven years old, before the south door, the preservation of whose life was not less remarkable. She was taken up from before the door by the wind, and carried above 30 rods. The people there are persuaded, she was carried over the tops of trees, being first seen running towards the house, in the edge of a thick wood, several rods from the course of the wind; having suffered no other injury, than breaking the collar-bone.

From the whole, it seems highly probable, that the house was suddenly plucked off from the sills (to which the upright posts are not fastened), and taken up into the air, not only above the heads of the persons, who were on the lower floor, but to the height of those parts of the chimneys, which were left standing, where, by the violent circular motion of the air, it was immediately hurled into ten thousand pieces, and scattered to great distances, on all quarters, except that, from which the wind proceeded. And it farther appears, that the violence of the wind in that place

place was over, as soon as the house was taken up; otherwise, no body could have been left on the floor.

I have now given a very circumstantial account of this furious blast; being persuaded, that an attention to every particular in effects is generally necessary to a discovery of their cause. It appears to me so difficult to assign a cause adequate to these effects, to shew by what means a small body of air could be put into a circular motion, so excessively rapid as this must have been, that I dare not venture any conjectures about it. It would be a great satisfaction to me, to know your sentiments, or those of any other learned gentlemen of the Royal Society, upon this article.

I beg leave to subscribe myself,

With the greatest respect,

Reverend Sir,

Your most obedient and

most humble servant,

John Winthrop.

Cambridge, New England,
30 July 1760.